National Transportation Safety Board
Aviation Accident Final Report

Location:	Hayward, CA	**Accident Number:**	LAX05LA134
Date & Time:	04/12/2005, 0855 PDT	**Registration:**	N16TN
Aircraft:	Newell Thomas RV6-A	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The airplane collided with an unoccupied truck short of the runway, following a total loss of engine power. Shortly after departure, and during the initial climb, the engine experienced a total loss of power. The pilot was unable to make it to the runway surface and the airplane collided with a truck located in a city maintenance yard. The airplane had undergone repairs from a previous accident 9 months prior to this accident. The airplane had flown a total of 1.6 hours since being returned to service. The repairs included the airplane being outfitted with new aluminum fuel tanks (supplied by the pilot), as the previous tanks had been damaged. There was no evidence that the mechanic who installed the fuel tanks or the pilot ever flushed the fuel system. At the accident site the glass fuel filters were removed from the airplane for examination and dark debris lining both filters was observed. Examination of the right fuel filter disclosed that fuel would not flow from the outlet side, but was able to flow from the inlet side, due to debris contamination. The fuel filters were automobile specific and visible to the pilot from the cockpit. Trace amounts of fuel were found throughout various points in the fuel system, including the fuel pumps and carburetor bowl. An examination of the carburetor's brass float found scrape marks, or chaffing on each side. The fuel lines were contaminated with a foreign particulate matter and flow tests using air found that the contaminants hindered air flow through the lines. The fuel filters were sent to the Safety Board Material Laboratory for analysis of the contaminants. An energy dispersive spectroscopy (EDS) was used to identify the material inside the filters as corroded iron or steel particles and dirt. Several larger pieces of a white material were identified as either plastic or paint. The quantity and size of the debris could have significantly impeded the flow of fuel through the filter.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A loss of engine power due to fuel system contamination. A factor in the accident was the fuel system not being flushed out after it was involved in a previous accident where the fuel tanks were damaged.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) FUEL SYSTEM - CONTAMINATION,OTHER THAN WATER
2. (C) MAINTENANCE,MAJOR REPAIR - IMPROPER - OWNER/BUILDER
3. (C) FUEL SYSTEM,FILTER - FOREIGN MATERIAL/SUBSTANCE
4. (C) FUEL SYSTEM,FILTER - FLOW RESTRICTED
5. (C) FUEL SYSTEM,LINE - BLOCKED(PARTIAL)
6. (C) FLUID,FUEL - STARVATION

Occurrence #2: FORCED LANDING
Phase of Operation: DESCENT - EMERGENCY

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: EMERGENCY LANDING

Findings
7. OBJECT - VEHICLE

Factual Information

HISTORY OF FLIGHT

On April 12, 2005, about 0855 Pacific daylight time, a Newell Thomas RV-6A, N16TN, collided with a truck in a city maintenance yard short of the runway at the Hayward Executive Airport, Hayward, California. The pilot/owner was operating the airplane under the provisions of 14 CFR Part 91. The private pilot, the sole occupant, sustained minor injuries; the airplane sustained substantial damage. The personal flight was originating from Hayward with a planned destination of Livermore Municipal Airport, Livermore, California. Visual meteorological conditions prevailed, and a flight plan had not been filed.

Shortly after departure, and during the initial climb, the pilot reported to an air traffic controller that his engine was running rough. He made a request to return back to the airport and maneuvered the airplane in that direction. The engine experienced a total loss of power and the pilot declared that he would be unable to make it to the runway surface. During the forced landing, the airplane collided with a truck located in the Hayward City Maintenance Center.

In a telephone conversation with a National Transportation Safety Board investigator, the pilot stated that prior to departure he preformed a preflight inspection. During the inspection he strained fuel samples from both fuel tanks, noting no anomalies. He estimated that the left tank was about half full and the right tank was about 3/4 full. After takeoff, the airplane climbed to about 1,200 feet mean sea level (msl). The pilot maneuvered the airplane into a level attitude in an effort to remain below the 1,500-foot base of Oakland's class "C" airspace. The flight continued normally as the airplane approached the Hayward Hills, an area of high terrain separating Hayward from Livermore. Shortly thereafter, the engine quit. The pilot maneuvered the airplane back toward the Hayward airport and began troubleshooting the loss of power by switching fuel tanks with the boost pump remaining in the "on" position.

The pilot further stated that despite his troubleshooting efforts, he could not restart the engine. With populated areas below, he opted to glide towards the airport and maintained an attitude to obtain the best glide speed of 85-90 knots. As the airplane approached the airport he realized that due to his low altitude, he would be unable to make it to the runway surface. He directed the airplane toward the only unpopulated area that he could discern, a vacant lot. The airplane collided with an unoccupied truck and he egressed.

In a written statement, the Federal Aviation Administration (FAA) inspector, who responded to the accident, stated that he obtained copies of the air traffic control tapes. The tapes revealed that during the initial climb, the pilot reported to the air traffic controller that the airplane's canopy lock had become unlatched and he wanted to return to the airport. Shortly after the transmission he reported that the engine had quit.

PERSONNEL INFORMATION

According to the FAA airman and medical records, the pilot held a private pilot certificate with airplane ratings for single engine land and instrument flight. The pilot was issued a third-class medical certificate on November 25, 2003, with the limitation that corrective lenses be worn.

A review of the pilot's personal flight records disclosed that the pilot's total flight time was about 1,724.5 hours, of which 4 hours were flown in the 90-day period preceding the accident.

In a written report submitted to the Safety Board, the pilot indicated that his total hours flown in a Vans RV-6 were about 80 hours.

AIRCRAFT INFORMATION

A Safety Board investigator reviewed the airplane's Aircraft and Registry files which were maintained by the FAA. The experimental Vans RV-6 airplane, serial number 22305, was certificated by the builder in 1998. Both Phase 1 and Phase 2 limitations were issued on May 4, 1998. The accident pilot purchased the airplane from the builder on September 5, 2003.

The engine logbooks revealed that the engine had undergone a major overhaul on January 17, 2005. A review of the airframe logbook disclosed that on November 1, 2004, at the engine tachometer time of 598.4 hours, the airplane was fitted with new fuel tanks (supplied by the pilot). Additional repair work was completed on the wings including replacement of leading edge skin. According to the mechanic who installed the fuel tanks, he delivered the wings to the pilot with the fuel tanks still open and did not flush out the fuel system. The repairs were made about 1.6 flight hours prior to the accident flight.

The airplane's fuel system consists of two aluminum tanks located in the inboard section of both the left and right wing along the leading edge; both tanks have a capacity of 19 gallons. Fuel from the selected tank egresses via a 3/8-inch aluminum tube. The system is designed for the fuel to progresses down the fuel line, through a fuel filter, and continue into the fuel selector valve (located in the cockpit, enabling the pilot to select the "left", "right" or "off" position). The fuel continues from the selector through a single fuel line, passing through the electric auxiliary fuel pump, which is attached to the left sidewall of the cockpit near the pilot's rudder pedals. The fuel continues to the engine driven fuel pump and then onto the carburetor. The airplane was not equipped with a gascolator.

The FAA records disclosed that the airplane was involved in a previous accident on July 16, 2004, at Reid Hillview Airport of Santa Clara County, San Jose, California. During the accident, the airplane impacted an airport perimeter fence after the pilot landed long during a precautionary landing. The airplane incurred damage to the wings.

WRECKAGE AND IMPACT

During a telephone conversation with a Safety Board investigator, the FAA inspector stated that he conducted an inspection of the airplane and engine. The inspector added that the fuel selector was set to the "off" position. His interview with a first responder revealed that the responder had turned to fuel selector to "off," but it was initially set to the "right" position when he arrived at the accident site. The responder also noted that about 38 gallons of fuel were removed from both wing tanks.

The airplane came to rest on the main landing gear, with the nose gear bent back under the fuselage. The nose incurred impact damage and the propeller was bent aft. The inspector established fuel line continuity on the engine and noted that all the carburetor linkages were intact. The engine components were accounted for and appeared intact. The tachometer indicated a total time of 600 hours.

The right wing was impact damaged, which appeared to have resulted from the leading edge striking a vacant truck. The right fuel tank was compromised. The left wing was intact and the fuel cap remained tightly sealed. The inspector did not find contamination in the left fuel tank.

TESTS AND RESEARCH

The FAA inspector preformed a detailed examination of the airplane and provided a written statement of his findings. He stated that while at the accident site, he removed the glass fuel filters from the airplane observing dark debris lining both filters. He thought that the contaminants appeared to block the outlet of the filters, prohibiting fuel to pass to the selector. An examination of the right filter revealed that it was remarkably covered with a thick debris layer. He manipulated the fuel selector's orientation in an effort to see if fuel could escape from either end. He noted that fuel could not egress from the outlet side (where fuel egresses from the filter to continue onto the fuel selector), but was able to pour from the inlet side (where the fuel normally enters the filter from the fuel tank). He performed the same test on the left filter and discovered that fuel could egress from both sides of the filter. He further noted that an examination of the filters revealed that they were automobile specific.

Removal of both fuel pumps revealed trace amounts of fuel were present in both. The fuel line to the carburetor was impact damaged. The inspector removed the carburetor and did not observe any fuel to be present in the fuel line connecting the engine driven fuel pump to the carburetor. There was no fuel present in the carburetor fuel screen. He separated the fuel bowl, noting a small amount of fuel remained in the carburetor bowl about 1/4-inch in depth. An examination of the brass float displayed scrape marks on each side. Air passed through the input fuel lines and no restrictions were found.

An additional FAA inspector looked at the wreckage several days later. An examination of the fuel system revealed that the fuel lines were blocked with a foreign particulate matter. Upon trying to use his exhalation to blow through the fuel lines, he discovered that he was unable to pass air through the lines. He noted that the right vent line appeared to be kinked from impact damage.

The FAA inspector rotated the engine via the propeller. He established the engine's internal mechanical continuity during rotation of the crankshaft and upon attainment of thumb compression. The engine representative removed the top spark plugs. The spark plug electrodes were gray in color, which corresponded to normal operation according to the Champion Aviation Check-A-Plug AV-27 Chart.

The fuel filters were sent to the Safety Board Material Laboratory for analysis of the contaminants within. An energy dispersive spectroscopy (EDS) was used to identify the material inside the filters as corroded iron or steel particles and dirt. Several larger pieces of a white material were identified as either plastic or paint.

Pilot Information

Certificate:	Private	**Age:**	70, Male
Airplane Rating(s):	Single-engine Land	**Seat Occupied:**	Unknown
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	11/01/2003
Occupational Pilot:		**Last Flight Review or Equivalent:**	04/01/2004
Flight Time:	1724 hours (Total, all aircraft), 80 hours (Total, this make and model), 1566 hours (Pilot In Command, all aircraft), 4 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Newell Thomas	**Registration:**	N16TN
Model/Series:	RV6-A	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental	**Serial Number:**	22305
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	05/01/2004, Condition	**Certified Max Gross Wt.:**	1650 lbs
Time Since Last Inspection:	19.2 Hours	**Engines:**	1 Reciprocating
Airframe Total Time:	600 Hours at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-360-A1D
Registered Owner:	On file	**Rated Power:**	180 hp
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	HWD, 50 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	0902 PDT	**Direction from Accident Site:**	135°
Lowest Cloud Condition:	Clear	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	Variable	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.11 inches Hg	**Temperature/Dew Point:**	11°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Hayward, CA (HWD)	**Type of Flight Plan Filed:**	None
Destination:	Livermore, CA (LVK)	**Type of Clearance:**	VFR
Departure Time:	0840 PDT	**Type of Airspace:**	Class D

Airport Information

Airport:	Hayward Executive Airport (HWD)	**Runway Surface Type:**	Asphalt
Airport Elevation:	50 ft	**Runway Surface Condition:**	Dry
Runway Used:	28L	**IFR Approach:**	Unknown
Runway Length/Width:	5024 ft / 150 ft	**VFR Approach/Landing:**	Forced Landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	37.659167, -122.122222

Administrative Information

Investigator In Charge (IIC):	Zoe Keliher	**Report Date:**	06/28/2006
Additional Participating Persons:	Denny Pollard; Federal Aviation Administration; Oakland, CA		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		